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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Maligeorgos, James		
Title:	Voltage Controlled Quadrature Oscillator with Phase Tuning		
Serial No.:	09/776,392	Filing Date:	02/02/2001
Examiner:	Unassigned	Group Art Unit:	Unassigned
Docket No.:	M-12181 US		

Austin, Texas
September 26, 2001

COMMISSIONER FOR PATENTS
Washington, D. C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Prior to examining this patent application, please enter the following amendments and consider the following remarks.

10/09/2001 TGEDAMU1 00000038 192386 09776392
01 FC:203 37.00 CH

AMENDMENTS

In The Claims

The following is a clean version of the entire set of pending claims. Those to which no amendment has been requested appear in small print.

1. An oscillator comprising at least two phase delay stages, each of said phase delay stages having an input for controlling the phase delay of the respective stage.

2. A regenerative frequency divider which includes the oscillator of claim 1.

3. An image reject mixer which includes the regenerative frequency divider of claim 2.

4. (NEW) An electronic circuit comprising:

a ring oscillator, the ring oscillator comprising a plurality of stages;

wherein at least one of the plurality of stages has an input for varying a phase delay of the at least one of the plurality of stages.

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP
25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200
FAX (408) 453-7979

5. (NEW) The electronic circuit as recited in Claim 4, further comprising:
a current source coupled to the input.

6. (NEW) The electronic circuit as recited in Claim 5, wherein
the current source comprises a transistor, and
a base of the transistor is coupled to an input voltage to control an amount of current from the current source.

7. (NEW) The electronic circuit as recited in Claim 4, further comprising:
a controllable capacitor coupled to the input.

8. (NEW) The electronic circuit as recited in Claim 4, further comprising:
a controllable inductor coupled to the input.

9. (NEW) The electronic circuit as recited in Claim 4, further comprising:
a controllable resistor coupled to the input.

10. (NEW) The electronic circuit as recited in Claim 4, wherein at least one of the plurality of stages comprises a differential amplifier.

11. (NEW) The electronic circuit as recited in Claim 10, wherein the differential amplifier comprises a plurality of emitter-coupled transistors.

12. (NEW) The electronic circuit as recited in Claim 4, further comprising:
a second input coupled to the ring oscillator for receiving an input voltage having an input frequency causing the ring oscillator to have an oscillation frequency equal to half of the input frequency.

13. (NEW) The electronic circuit as recited in 12, wherein a phase shift calibrated at one input frequency does not need to be re-calibrated at a second input frequency.

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25 METRO DRIVE
SUITE 700
SAN JOSE, CA 95110
(408) 453-9200
FAX (408) 453-7979

14. (NEW) The electronic circuit as recited in Claim 4, wherein varying the phase delay is performed on two or more of the plurality of stages such than an oscillation frequency of the ring oscillator is not varied.

15. (NEW) The electronic circuit as recited in Claim 4, wherein:
a first input of a first stage of the plurality of stages is differentially varied with respect to a second input of a second stage of the plurality of stages.

16. (NEW) The electronic circuit as recited in Claim 15, further comprising:
a first current source coupled to the first input and a second current source coupled to the second input.

17. (NEW) The electronic circuit as recited in Claim 15, further comprising:
a first controllable capacitor coupled to the first input and a second controllable capacitor coupled to the second input.

18. (NEW) The electronic circuit as recited in Claim 15, further comprising:
a first controllable inductor coupled to the first input and a second controllable inductor coupled to the second input.

19. (NEW) The electronic circuit as recited in Claim 15, further comprising:
a first controllable resistor coupled to the first input and a second controllable resistor coupled to the second input.

20. (NEW) A method of providing a multiple stage ring oscillator comprising:
coupling two or more differential stages to form a ring oscillator; and
varying the phase delay of at least one of the two or more differential stages.

21. (NEW) The method as recited in Claim 20, wherein the varying is performed by supplying a current source to an input of the at least one of the two or more differential stages.

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SUITE 700
SAN JOSE, CA 95110
(408) 453-9200
FAX (408) 453-7979

22. (NEW) The method as recited in Claim 20, wherein at least one of the two or more differential stages is a differential oscillator.

23. (NEW) The method as recited in Claim 20, wherein the varying the phase delay provides a capability of quadrature output phase error correction with a resolution of less than 1°.

LAW OFFICES OF
SKJERVEN MORRILL
MACPHERSON LLP

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SUITE 700
SAN JOSE, CA 95110
(408) 453-9200
FAX (408) 453-7979